# NECK PAIN

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Neck pain is a ubiquitous symptoms and a frequent reason for patients to seek medical care. A recently reported random survey of 10,000 adults found that 34 percent of 7,648 respondents had experienced "troublesome neck pain" during the previous year.[1] Chronic neck pain, defined as neck pain lasting more than six months, occurred in 17 percent of women and 10 percent of men. This corresponds with an earlier study of 8,000 adults in which a "chronic neck syndrome" was identified in 13.5 percent of female respondents and 9.5 percent of males.[2]

Typically, neck pain does not indicate a serious medical condition. Most patients with neck pain do not require an evaluation by a neurosurgeon or cervical spine neuroimaging. Their conditions frequently are self-limited and require only symptomatic treatment, if any. Some patients, however, manifest serious cervical spine pathology by complaining of neck pain. Similar to other severely ill patients who present with common complaints, the timely identification of patients with neck pain who harbor serious disease can be crucial to successful treatment and optimal clinical outcome.

Two professional negligence claims from the case files of the Department of Legal Medicine at the Armed Forces Institute of Pathology, resolved with substantial payments, are presented to illustrate a number of important points.

## CASE 1

A 62-year-old man, with a history of diabetes mellitus and degenerative spine disease, presented to the primary care clinic of a federal hospital with a ten day history of fever, as high as 105° F, and sharp lower neck pain with bilateral shoulder discomfort. He had also experienced URI symptoms and was "still productive of brown sputum." When examined by a physician, the patient was afebrile, his lungs were clear, and his cervical spine demonstrated a full range of motion. There was a white blood count of 14,500 with a left shift, and a chest x-ray was unremarkable. The physician diagnosed acute bronchitis and prescribed an eight day course of antibiotics. No follow-up was specified.

Two weeks later, the patient was evaluated by the same provider for persistent neck, upper back and bilateral shoulder pain. The physician noted that the patient had experienced chronic cervical pain "since the 1950's" but that his condition had worsened during the previous two years, markedly so in the previous two months. Finding marginally decreased motor strength in the patient's upper extremities, where deep tendon reflexes were absent, the physician diagnosed acute and chronic cervical pain with diabetic peripheral neuropathy. Cervical spine x-rays were performed that day. Cervical spine CT was scheduled for one week later.

The plain films were interpreted as demonstrating "hypertrophic degenerative changes" only. Later review disclosed, however, a destructive process at the C6/7 interspace involving the superior aspect of the C7 vertebral body and the inferior aspect of the C6 vertebral body. There is no indication that the attending physician either reviewed the x-rays or received a contemporaneous report. Late in the day of this second evaluation, the patient sought treatment from a local civilian physical therapist. When cervical traction partially relieved the patient's shoulder pain, the physical therapist urged him to consult a neurosurgeon for a possible disc herniation.

Within several days, a neurosurgeon in private practice, having found "severe cervical spasms" and "mild weakness in [the] upper and lower extremities," advised the patient to present himself to a larger federal

medical center nearby and "demand to see a neurosurgeon." The civilian neurosurgeon later stated that he offered to admit the man to a local hospital but that the patient insisted on seeking care through the federal system.

The following day, the patient presented to the emergency department of the federal medical center and reported severe lower neck and shoulder pain. He was afebrile. Discomfort was elicited upon palpation of the "mid-lower thoracic spine." Motor strength in all extremities was documented as "good" and deep tendon reflexes as "wnl." A hilar mass was suspected on chest x-ray, and the patient was referred to the primary care clinic for further care, with a recommendation that he undergo a chest CT. A repeat chest x-ray was performed the next day, and a reviewing physician ruled out a hilar mass and determined that a **chest** CT was not indicated. Realizing that a cervical spine CT remained scheduled at the smaller federal hospital, the physician diagnosed "probable DJD. R/O herniated disc", scheduled an MRI of the cervical spine to be performed in three weeks, and requested neurosurgical consultation on a routine basis.

Cervical spine CT was performed the next day. The radiologist's written report noted "a mottled appearance to the C6 vertebral body" and that "osteolytic lesions can not be excluded." There is no indication that the physician who ordered the scan reviewed the study or the written report.

Three days later, the patient presented to the emergency department of a private community hospital and complained of increasing neck pain. The neurosurgeon who had previously evaluated him noted that the patient's upper extremity weakness had "worsened", especially in the intrinsic muscles of his hands. Biceps and triceps reflexes were absent bilaterally. Following admission to the hospital, the patient underwent diagnostic studies that included cervical spine x-rays, an MRI of the cervical spine and a radionuclide bone scan. These strongly suggested osteomyelitis of the lower cervical vertebrae, cervical diskitis, and an epidural abscess.

The patient underwent surgery 26 days after initial clinical presentation. Epidural and prevertebral abscesses were drained, and a C6/7 discectomy with an anterior interbody fusion was performed. Cultured surgical specimens grew *Escherichia coli*. No additional neurologic examinations were documented during the hospitalization. The patient was discharged home on his tenth postoperative day.

A spine stabilization procedure was required three months later. Perioperatively, the patient was reported to have experienced mild weakness confined to wrist extensors and hand intrinsic bilaterally. These deficits were again detected upon neurologic examination two and a half years after the original surgery.

In time, the patient submitted a malpractice claim alleging that, as a result of a negligent delay in diagnosing his spinal abscess, federal health care providers had caused him to suffer permanent neurologic injury. Specialty reviewers concluded that the care rendered was substandard, and the claim was settled administratively.

## COMMENTS

Infection directly invades the epidural space from a local process, such as osteomyelitis, or hematogenously from a distant focus, such as a skin sore.[3] Urinary tract infections, peridontal abscesses, pharyngitis, pneumonia, and mastoiditis have also been implicated as distant sources for sepsis that results in a spinal epidural abscess. Symptoms in patients with untreated spinal epidural abscess have been described as progressing through four stages: spinal ache, root pain, weakness, and paralysis.[4] In on report, there was a history of antecedent or concurrent infection in three-quarters of the patients.[4] Fever exceeded 101°F in

14 of 18 patients in one retrospective study, and a mean peak temperature of 103°F was reported in another.[5,6]

Case 1 was somewhat unusual since the abscess was located in the anterior cervical spine and the causative organism was *Escherichia coli*. Typically, spinal abscesses are located posteriorly in the thoracic or lumbar spine, due to the greater width of the epidural space there.[3] *Staphylococcus aureus* is the organism most often involved, although *Mycobacterium tuberculosis* has been reported in some series as the responsible agent for as many as one-fourth of cases.[7] Interestingly, although anterior abscesses are uncommon, the majority of them occur with cervical osteomyelitis, as in the case presented.[6]

In one study undertaken before neuroimaging was widely available spinal abscess pain was present for a mean of 16 days before hospitalization.[7] Timely diagnosis of a spinal epidural abscesses difficult for several reasons. First, the disease is relatively rare.[3] In addition, a practitioner must entertain the diagnosis while much more common causes of neck pain, such as degenerative joint disease or myalgias, operate as clinical confounders. Another reason for delay is that this rare diagnosis must be suspected and pursued by primary health care providers who may have never encountered a case clinically. Modern pressures on providers to control costs by ordering diagnostic studies less frequently, especially expensive ones like neuroimaging, and seeking consultations more selectively may aggravate diagnostic delay.

In the case presented, those factors may have all played some role in delaying the diagnosis of the patient's cervical abscess and associated vertebral osteomyelitis. More importantly, however, significant errors in fundamental clinical skills were committed. They include inadequate evaluations and follow-up, radiographic misinterpretation, miscommunication between providers, and problematic documentation. Each materially contributed to prolonging the time spent before a difficult diagnosis was confirmed.

Another potentially devastating disease process that often presents with localized a traumatic neck pain progressing to radicular pain, then weakness, is a tumor.[8] A recent trial judgment against the United States involved a woman who had experienced neck, upper back and upper extremity pain, while manifesting ambiguous neurologic signs for months.[9] She was variously diagnosed with degenerative joint disease, tension headaches and multiple sclerosis. Ultimately, a foramen magnum meningioma was detected.

Despite the widespread availability of neuroimaging, tumors of the foramen magnum still evade early diagnosis.[10] In a review of 102 cases, two-thirds presented with neck pain and nearly 60 percent with dysethesias.[11] In this patient's case, difficult diagnosis was made impossible by incomplete and uncoordinated evaluations that were rendered at different facilities by different providers, each of whom, among other things, missed the tumor on the inferior cuts of a cranial MRI obtained to confirm multiple sclerosis.

For reasons similar to those that contribute to the delayed diagnoses of spinal epidural abscesses, tumors in our around the cervical spine are frequently recognized only after permanent neurologic injury occurs. Clinical errors only exacerbate the diagnostic delays.

## CASE 2

Two weeks after falling, a 45-year-old man presented to the outpatient department of a federal health care facility complaining of right upper extremity pain with intermittent numbness and tingling. The medical record also noted "upper thoracic spinal pain." Motor and sensory examinations of the upper extremities were recorded as normal. Cervical spine x-rays demonstrated a posterior spur at C5 and a narrowed disc space at C5/6.

Four weeks later, the man presented in the late evening to the emergency department of the same facility. On a preprinted form, the admitting nurse indicated that the patient was ambulatory on arrival. In a SOAP note, she wrote for subjective complaints that "My pain has been here since '71 and I want it gone" and for the objective findings "Helicopter crash and C-spine injury—c/o weakness, tingling in extremities." The assessment was "ETOH overload—back pain", and the plan was "Eval."

The evaluating physician, a third-year internal medicine resident, recorded that the patient had been in a helicopter accident 15 years previously and had suffered a "C-spine injury." He noted that the patient was complaining to him of upper extremity tingling bilaterally and weakness of his lower extremities but denying bowel or bladder incontinence. The patient also reported severe neck and shoulder pain for which he had been drinking considerable amounts of alcohol and taking acetaminophen with codeine. The available medical record does not specify a time of onset for the patient's symptoms.

According to the physician, the patient had entered into a physical altercation with his wife while waiting to be evaluated, and the patient had also struck him. The resident specifically recalled helping the patient walk to a seat in the waiting room of the emergency department.

When examined, the patient was initially combative and verbally abusive. He later calmed down. His breath smelled strong of alcohol. Neurologic examination was notable for mild weakness in all upper extremity muscle groups tested and for lower extremities that "would not move at all." Because there was ambulation with assistance earlier, the physician concluded that the patient was "not making any effort." No further neurologic testing by that provider was documented. There is no record of deep tendon reflexes or a sensory exam. Laboratory studies were unremarkable except for a blood alcohol of 256 mg./dl. An on-call neurosurgical resident advised a re-evaluation when the patient was sober and, if true weakness existed, a cervical spine MRI.

The next medical record entry is a note by a consulting neurologist in the middle of the following morning. A more extensive history, with a chronology of the patient's neurologic symptoms, is documented. Pain and tingling in the neck and arms had begun three days earlier. During the previous evening, approximately an hour before presenting to the emergency department, developed "increasing weakness in his legs such that he could not bear weight." Examination revealed a C7 quadriplegia with a C8 pin-prick level. Intravenous dexamethasone was administered, and the patient underwent an emergency cervical spine MRI. Two large disc herniations at C4/5 and C6/7 were demonstrated.

The patient was brought to surgery six hours later, and a C6/7 anterior discectomy with fusion was performed. His neurologic exam revealed no change postoperatively and remained stable two years following surgery.

A federal malpractice claim alleged that a failure to properly diagnose and treat a neurologic emergency had resulted in the patient's quadriplegia. A large structured settlement was eventually negotiated.

## COMMENTS

Cervical disc disease does not always present as a nagging chronic condition. The first case report of cervical disc surgery in 1892 involved a young man who developed progressive weakness of all extremities after a fall.[12] Two authorities in spinal disease have written that "[ a ]lthough acute and chronic cervical disc degeneration are likely to be stages in the same degenerative process, they must be handled separately in clinical discussion."[13] These authors have also noted that "the syndrome of acute cervical disc herniation is attended by severe pain that

leads to voluntary immobilization of the neck" whereas "the pain of chronic disc degeneration, though at times severe, may wax and wane, sufficiently to allow those affected to maintain a relatively normal activity schedule."

Obtaining a reliable history in severely traumatized patients is often hindered by head injuries, drugs, or alcohol. Similarly, a physical examination, particularly a neurologic examination, is ideally performed on a cooperative, intelligent and articular patient, one rarely brought to an emergency department following major trauma.

The initial delay in diagnosing an acute disc herniation in Case 2 resulted from a drastic abridgement of history taking and physical examination due to understandable, yet problematic, factors. Confirming this diagnosis by MRI three hours after it was suspected may seem reasonable to practitioners accustomed to their patients waiting weeks for such a study. The ensuing three and one-half hours before commencement of spinal cord decompression probably resulted from an extremely busy operating room suite. Although each segment in the sequence can be explained, a 20-hour delay between presentation and spinal cord decompression, when the patient progressed from ambulation to quadriplegia, would not likely be considered consistent with acceptable care by professional peers or a civil court.

Neck pain that follows its two most common traumatic antecedents, motor vehicle accidents and falls, usually emanates from soft tissue injuries and is relatively innocuous. One article, premised upon data from a Swiss accident insurance firm, reported that 87 percent of post-traumatic cervical complaints were the result of soft tissue injuries.[14] Nevertheless, the American College of Surgeons, recognizing the potential devastation wrought by underestimating serious neck injuries, urges participants in its Advanced Trauma Life Support course to "[a]ssume a cervical spine fracture in any patient with multisystem trauma."[15]

In a review of 300 cervical spine fractures, 100 were initially missed in the emergency department.[16] Delayed diagnoses most commonly occurred in those patients with serious head injuries, those with other fractures or multiple injuries, and those who were intoxicated.

Recently, two large settlements occurred in federal cases that involved patients with persisting neck pain after odontoid fractures were not properly diagnosed. Misinterpretations of x-rays, along with an unwillingness to reconsider initial clinical misimpressions, were at the heart of liability.

## FINAL COMMENTS

In the cases presented, neck pain, a common symptom in general medical practice, appeared as a harbinger of uncommon but serious disease processes. As such, these cases share particular characteristics with similar clinical situations frequently subjected to allegations of medical malpractice for delayed diagnosis.

To appreciate disease progression, a skilled practitioner blends critical features from a directed history with occasionally subtle signs from a focused physical examination. Under certain circumstances, serially repeated examinations should be performed. Alternative diagnoses, some relatively rare, are then reasonably considered. Appropriate diagnostic studies and specialty consultations to confirm those impressions may, in turn, be justifiably obtained. Omitting or improperly abridging a step in this fundamental process will likely blind a practitioner to all but the most common diagnoses and significantly increase the possibility that a difficult diagnosis will be inordinately delayed.

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***ANSWERS TO CME QUESTIONS***

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| 1. C | 6. D | 11. C | 16. D |
| 2. B | 7. D | 12. D | 17. E |
| 3. E | 8. C | 13. D | 18. D |
| 4. E | 9. D | 14. E | 19. A |
| 5. C | 10. B | 15. E | 20. B |